

University of Innsbruck / Timber Engineering Unit holzbaulehrstuhl
Universität Innsbruck

Quality Control in Wood Construction

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Workshop 2 – 2011 Wood Structures Symposium

What is quality?

Quality is defined as:
 “Degree to which a set of inherent characteristics fulfills requirements”
 -ISO 9001:2008-

Quality management
 ... the whole of features and characteristics of a product regarding its ability to meet the quality requirements.
 EN ISO 9000

Rules for the organization, implementation and monitoring of measures

2

Regulations and quality marks



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3

Why quality control?



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4

Why quality control?



Environmental protection



Heating and cooling costs



Comfort

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5

Quality requirements

What customers want:

- Customer focus and customer service
- Compliance with the contractual agreed quality

What companies want:

- Profitable construction project
- Compliance with the contractual agreed quality

6

Quality management - works!

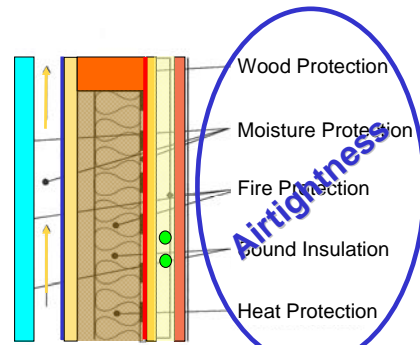


stave church - 900 years



farm - 500 years

Quality requirements - present



Materials for timber constructions



Support by certified constructions

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Home / Trenndecke / Kinnwald

Kontext: Nutzungsforderungen: Behälteranlagung

Bauteile - Trenndecke - tdnmx02a

Trenndecke
Anforderungen
abgefragt:
2020

Bestellvorgaben zur Konstruktion, Schichtaufbau
(von oben nach unten, Maße in mm)

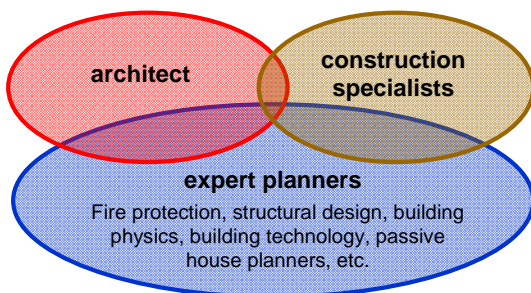
Stärke Bauteile	h	ρ	λ	α	γ	Wärmedurchl. U-Wert	Stärke Bauteile h
A	50.0	500	0.040	0.000	0.000	0.000	50.0
B	50.0	500	0.040	0.000	0.000	0.000	50.0
C	50.0	500	0.040	0.000	0.000	0.000	50.0
D	50.0	500	0.040	0.000	0.000	0.000	50.0
E	50.0	500	0.040	0.000	0.000	0.000	50.0
F	50.0	500	0.040	0.000	0.000	0.000	50.0
G	50.0	500	0.040	0.000	0.000	0.000	50.0
H	50.0	500	0.040	0.000	0.000	0.000	50.0
I	50.0	500	0.040	0.000	0.000	0.000	50.0

Bestellvorgaben

Nr.	Bestellbezeichnung	Brand	Wärme	Stärke	Stärke	Stärke	Stärke
01	Leitung auf 10 mm	01	0.01	0.01	0.01	0.01	0.01
02	Leitung auf 10 mm	02	0.02	0.02	0.02	0.02	0.02
03	Leitung auf 10 mm	03	0.03	0.03	0.03	0.03	0.03

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Quality criteria for the construction process



Requirements for high quality products

- **Quality Awareness**
 - The company management must want quality
- **Quality Production**
 - Specialization, prefabrication
- **Quality Products**
 - Clear definition, e.g. wall elements with quality certification labels
- **Quality Control**
 - Internal and external controlling (external monitoring)
- **Quality Management**
 - Procedures: Organization and implementation of measures

Quality Control

Quality Monitoring during Production and Construction



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13

Quality Control

Quality Monitoring during production and construction



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14

Quality Control

Quality Monitoring during Production and Construction



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15

Quality Control

Damage caused by leakages



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16

Quality Control

Damage caused by leakages



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17

Quality Control

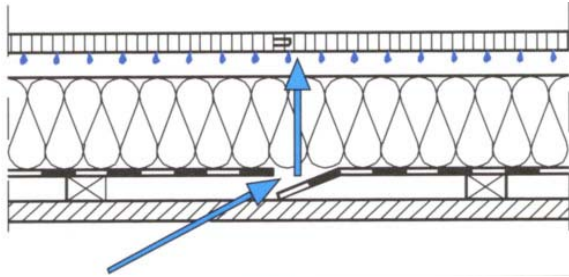
Damage caused by leakages



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18

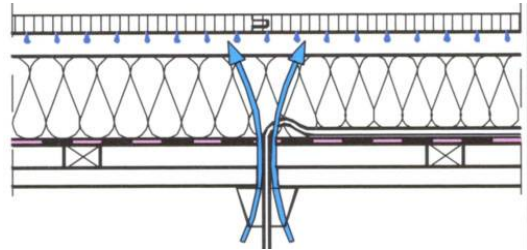
Planning and execution fault



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19

Planning and execution fault



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20

Why quality control? Why airtightness?

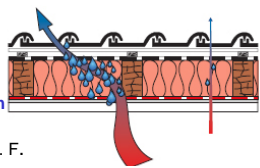
Problem: A gap with airflow from humid side

outside: 0°C, 80% r. F.



360g water/day/m

inside: 20°C, 50% r. F.



1 mm gap in construction

For comparison: with vapor diffusion, only 1g water/day/m²

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21

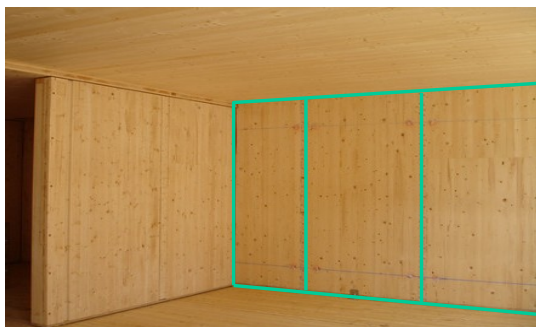
Quality assurance by quality monitoring



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22

Quality assurance by quality monitoring



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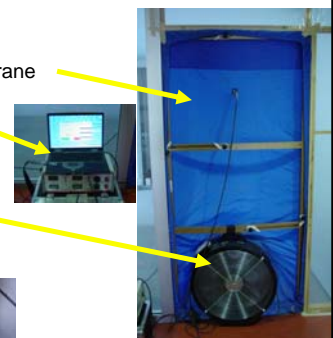
23

Quality control – airtightness

Measuring System

- Door frame with a membrane
- Measuring Instrument (data capture and evaluation)
- Fan

Aids and Appliances

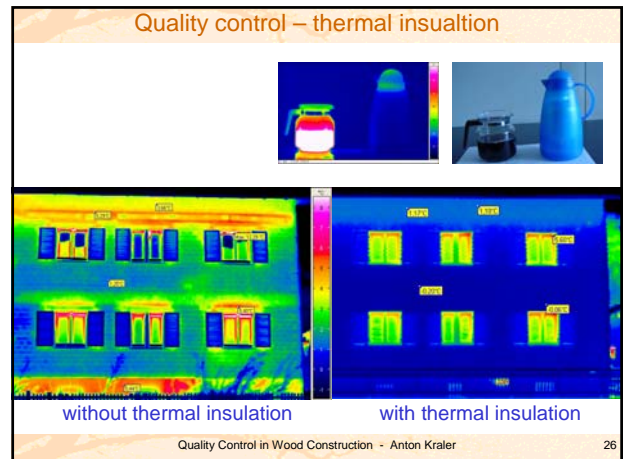


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24



25



26

Why quality control? Why airtightness?

Heat loss through leakage

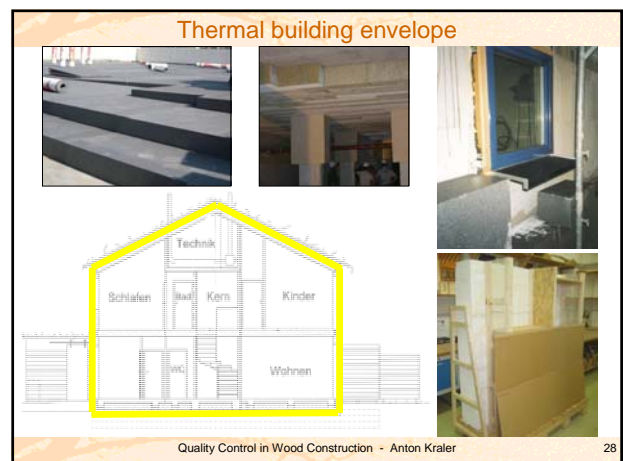
4.8 times more heat is lost across the gap than over the entire surface of 1m² of insulation.

Example:
 $U\text{-Value (calculated)} = 0.30 \text{ W/m}^2\text{K}$
 $U\text{-Value with the gap } (0.30 \text{ W/m}^2\text{K} \times 4.8) = 1.44 \text{ W/m}^2\text{K}$

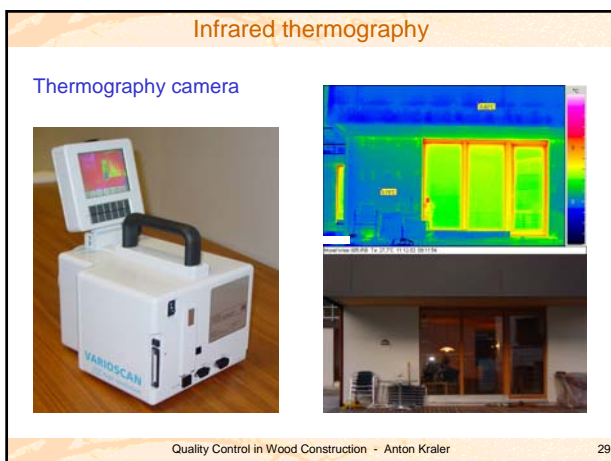
outside: 0°C, 80% r. F.; inside: 20°C, 50% r. F.;

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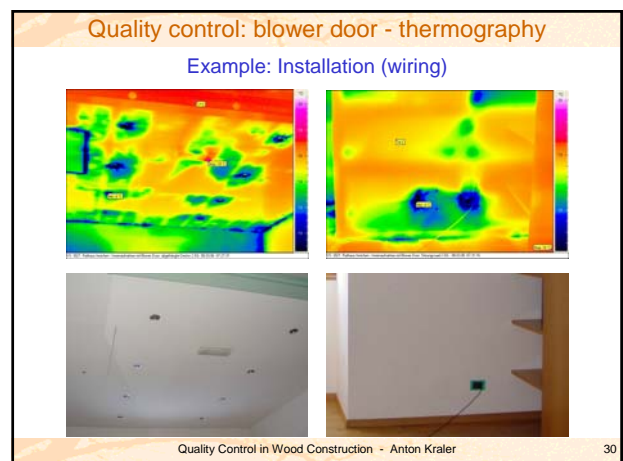
27



28



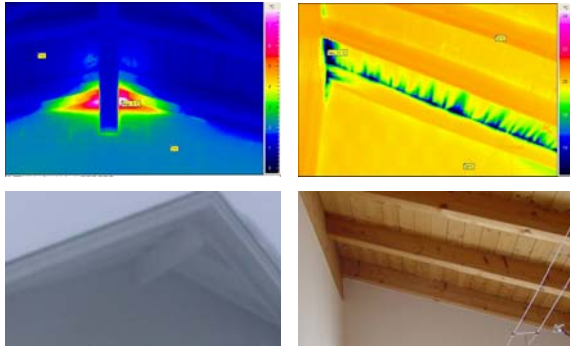
29



30

Quality control: blower door - thermography

Example: roof connection

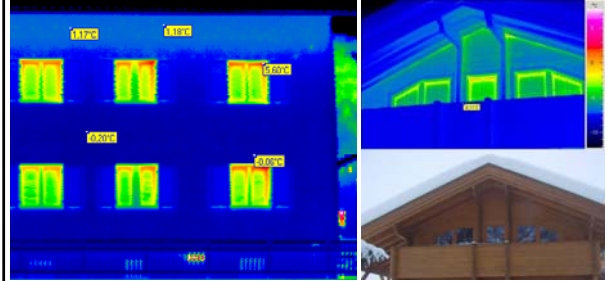


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31

Quality control: blower door - thermography

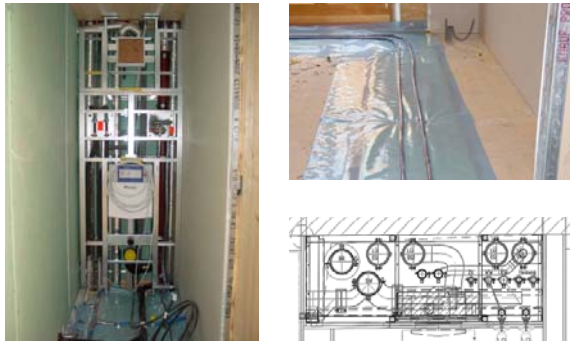
Example: faultless execution



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Quality control: heating, water, ventilation



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34